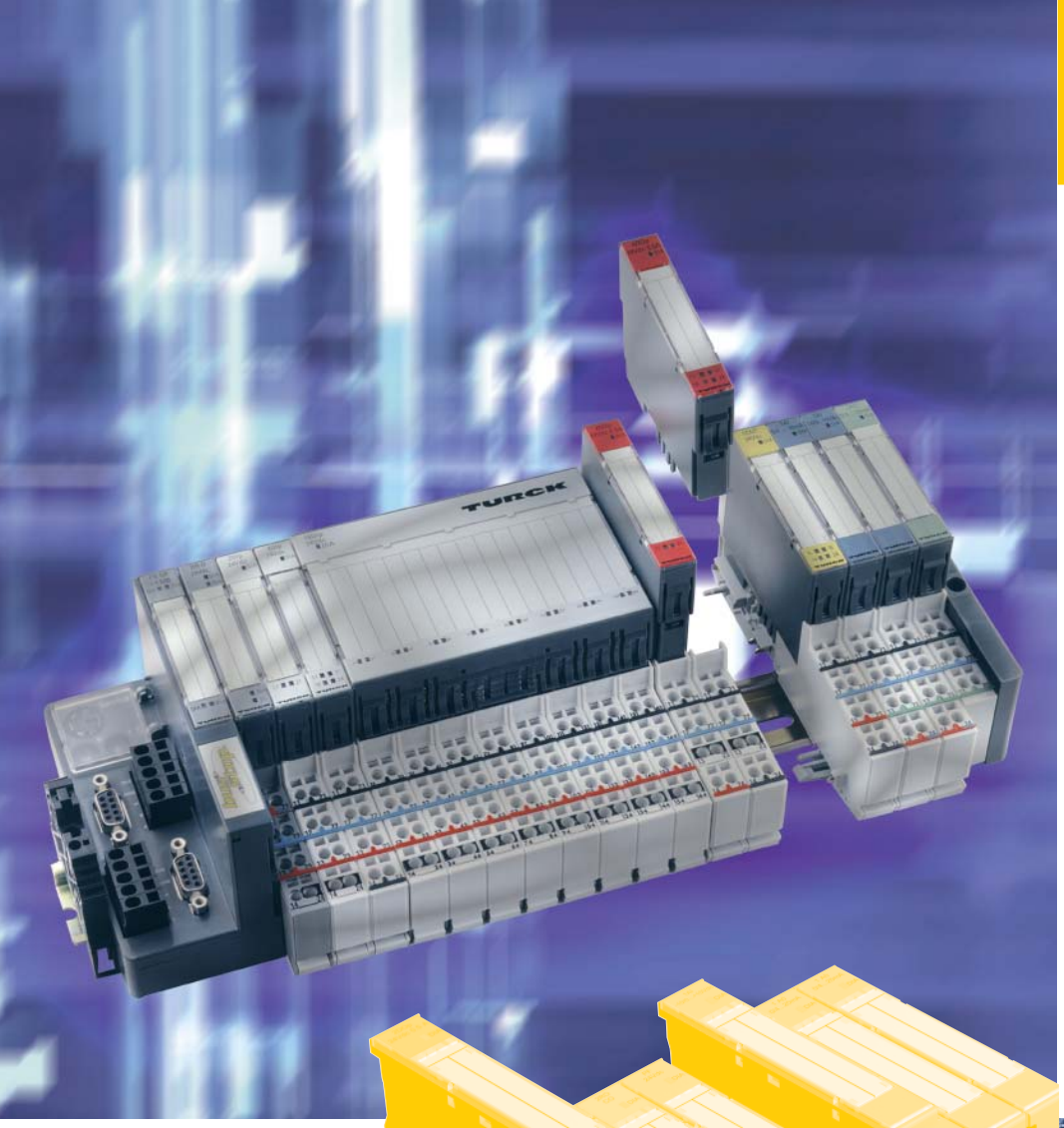
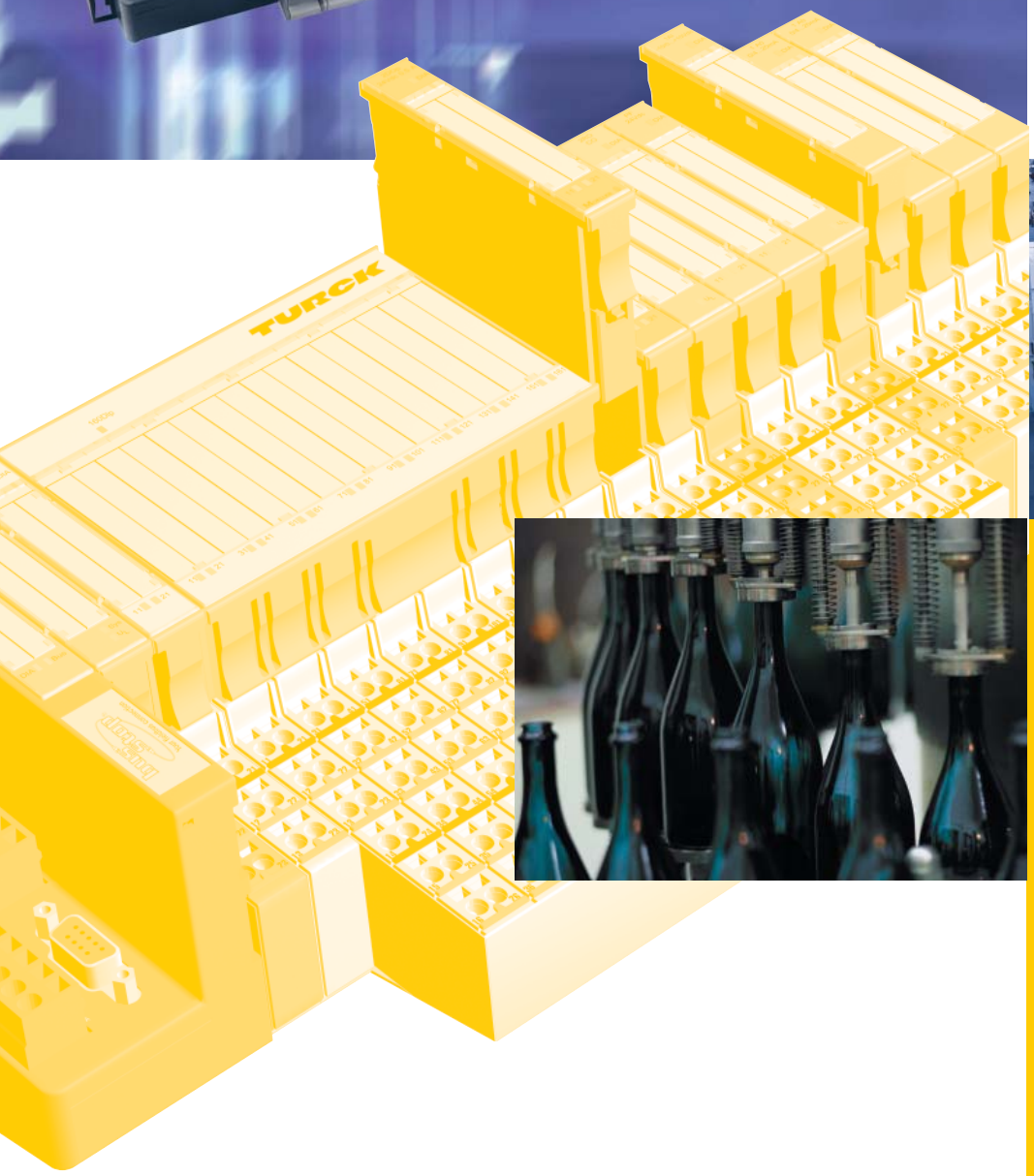
TURCK

Industrial
Automation

# BL20 – Redundant power supply

## BL20-BR-24VDC-RED



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## 1.1 General

This manual describes the BL20 Bus Refreshing module for redundant power supply BL20-BR-24VDC-RED.

It contains the description of the technical features and functions as well as special installation guidelines.

The BL20-BR-R24VDC-RED can currently only be used with some gateways, specified within chapter 3, Installation guidelines: BL20-BR-24VDC-RED (page 3-1).

### 1.1.1 Additional documentation

- D300717 "BL20 I/O modules - Hardware and Engineering"
- D300956 "BL20/BL67– USER MANUAL FOR PROFIBUS-DPV1"
- D301004 "BL20 – Gateway for Modbus TCP"

## 1.2 Description of symbols used

**Danger**

This sign can be found next to all notes that indicate a source of hazards. This can refer to danger to personnel or damage to the system (hardware and software) and to the facility.

This sign means for the operator: work with extreme caution.

**Attention**

This sign can be found next to all notes that indicate a potential source of hazards.

This can refer to possible danger to personnel and damages to the system (hardware and software) and to the facility.

**Note**

This sign can be found next to all general notes that supply important information about one or more operating steps.

These specific notes are intended to make operation easier and avoid unnecessary work due to incorrect operation.

## 1.3 Overview

**Attention**

Please read this section carefully. Safety aspects cannot be left to chance when dealing with electrical equipment.

This manual includes all information necessary for the prescribed use of TURCK devices. It has been specially conceived for personnel with the necessary qualifications.

### 1.3.1 Prescribed use

Appropriate transport, storage, deployment and mounting as well as careful operating and thorough maintenance guarantee the trouble-free and safe operation of these devices.

**Danger**

The devices described in this manual must be used only in applications prescribed in this manual or in the respective technical descriptions, and only with certified components and devices from third party manufacturers.

### 1.3.2 Notes concerning planning /installation of this product

**Danger**

All respective safety measures and accident protection guidelines must be considered carefully and without exception.

# 2 Technical description


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## 2.1 General function description

The module BL20-BR-24VDC-RED allows the redundant power supply of the BL20-System by redundant feed-in of system voltage $U_S$ and field voltage $U_L$.

### 2.1.1 Usage of BL20-BR-24VDC-RED

The usage of the redundant BL20-BR-24VDC-RED modules is only supported by some BL20-gateway types for some fieldbus protocols:

PROFIBUS-DPV1 (usage and installation guidelines, see chapter 3)

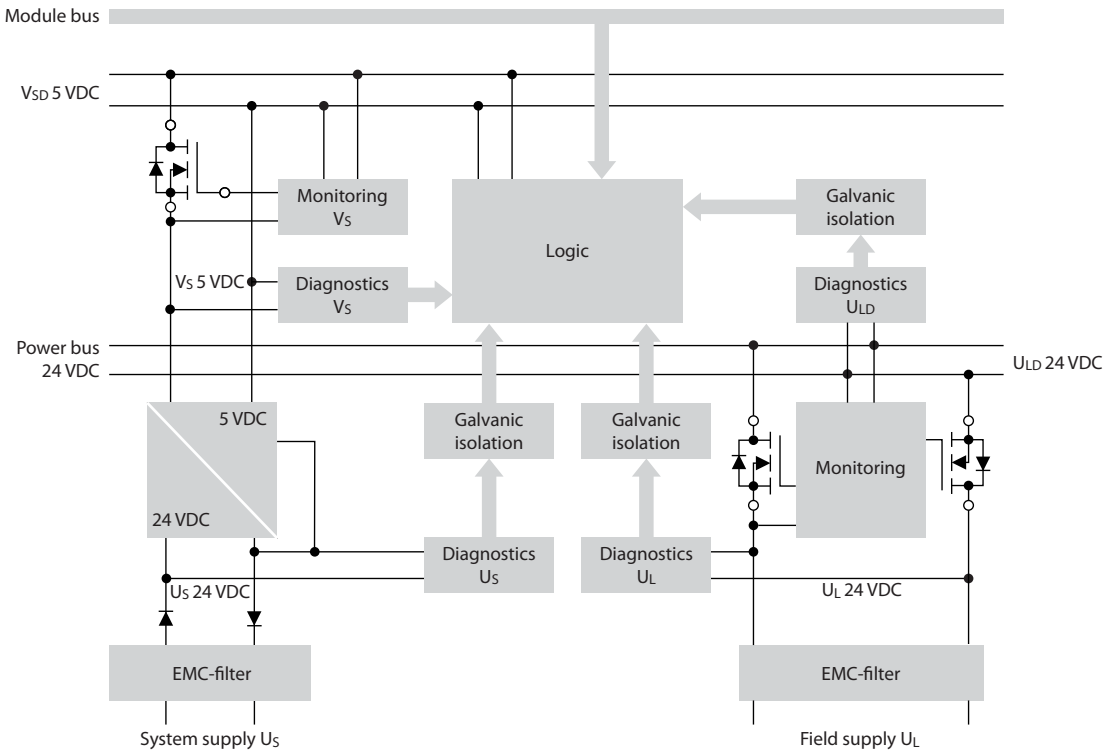
- BL20-GW-DPV1

Modbus TCP (usage and installation guidelines, see chapter 3)

- BL20-GW-EN

## 2.2 Block diagram (single BL20-BR-24VDC-RED)

*Figure 2-1: Block diagram of one single BL20-BR-24VDC-RED*




$U_S$ - system voltage (identical to $U_{SYS}$ at the gateway)
$U_L$ - field voltage
$V_S$ - module bus voltage
$U_{LD}$ - redundant field voltage
$V_{SD}$ - redundant module bus voltage

## 2.3 Technical data

*Table 2-1: Technical data*

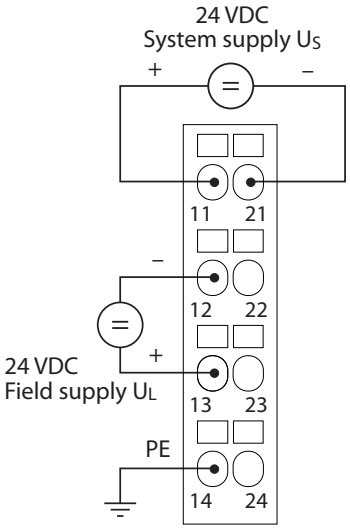
| Designation | BL20-BR-24VDC-RED |
|---|---|
| **General technical data** | |
| System voltage $U_S$ | 24 V DC (18 to 30 V DC) |
| Redundant module bus voltage $V_{SD}$ | 5 V DC |
| Module bus current $I_{MB}$ | max. 500 mA |
| Field voltage $U_L$ | 24 V DC (18 to 30 V DC) |
| Field current $I_L$ | max. 5 A |
| Power loss $P_V$ | < 1,5 W |
| **Ambient conditions** | |
| Operating temperature | -25 °C to 60 °C |
| Storing temperature | -25 °C to 85 °C |
| Relative humidity | 95 % |
| **Isolation voltages** | |
| $U_L$ to $U_S$ | 500 $V_{rms}$ |
| $U_S$ to $V_{SD}$ | no isolation |
| $U_L$ to $U_{LD}$ | |

**Note**

For all other technical data, please refer to the BL20 manual for I/O-modules (D300717 "BL20 I/O modules - Hardware and Engineering").

## 2.4 Wiring diagram

*Figure 2-2: Pin assignment BL20-BR-24VDC-RED*



## 2.5 LED description/ status display

*Table 2-2: LED-displays*

| LED | Display | Meaning | Remedy |
|---|---|---|---|
| DIA | Red | Module bus communication failure | Check if more than two adjoining electronics modules have been pulled. Check the power supply to the module bus. |
| | Off | No error message or diagnosis | – |
| $V_{SD}$ | Green | Redundant module bus voltage (5 VDC) present | – |
| | Off | Redundant module bus voltage (5 VDC) not present | Check the connection to the system voltage supply. |
| $V_S$ | Green | System voltage (5 VDC) present | – |
| | Off | System voltage (5 VDC) not present | Check the connection to the system voltage supply. |
| $U_S$ | Green | System voltage (24 VDC) present | – |
| | Off | System voltage (24 VDC) not present | Check the connection to the system voltage supply. |
| $U_L$ | Green | Field voltage (24 VDC) present | – |
| | Off | Field voltage (24 VDC) not present | Check the connection to the field voltage supply. |
| $U_{LD}$ | Green | Redundant field voltage (24 V DC) present | – |
| | Off | Redundant field voltage (24 V DC) not present | Check the connection to the field voltage supply. |

## 2.6 Parameter data

The module has no parameter data.

## 2.7 Diagnostic data of the module

The module has no diagnostic data, but it provides status information in the process input data (see Process input data (page 2-6)).

## 2.8 Process data of the module

### 2.8.1 Process input data

The module provides 4 Bit of process input data, which contain the following status information:

*Table 2-3: Process input bits*

| **Bit 3** | **Bit 2** | **Bit 1** | **Bit 0** |
|---|---|---|---|
| DIA $U_{LD}$ | DIA $V_S$ | DIA $U_S$ | DIA $U_L$ |

*Table 2-4: Meaning of process input bits*

| **Designation** | **Value** | **Meaning** |
|---|---|---|
| DIA $U_L$ | 0 | $U_L$ is not within the permissible range |
| | 1 | $U_L$ (24 V DC) is connected to the device |
| DIA $U_S$ | 0 | $U_S$ is not within the permissible range |
| | 1 | $U_S$ (24 V DC) is connected to the device |
| DIA $V_S$ | 0 | $V_S$ is not within the permissible range |
| | 1 | $V_S$ (5 V DC) for the module bus supply is delivered by the device |
| DIA $U_{LD}$ | 0 | $U_{LD}$ is not within the permissible range |
| | 1 | $U_{LD}$ (24 V DC) is connected to the device |

**PROFIBUS-DP**

In PROFIBUS-DP, **1 byte** is reserved for the status messages of **each** BL20-BR-24VDC-RED, whereas only **bits 0 to 3** are used as described above.

### Modbus TCP

In Modbus TCP, all process data of a station are mapped.

The following example shows a mapping report of a BL20-station with 4 BL20-BR-24VDC-RED (two redundantly supplied potential groups, see also Figure 3-2: Station assembly with BL20-GW-EN and redundant power supply) generated using the software tool I/O-ASSISTANT (FDT/DTM).

*Figure 2-3: Modbus report, mapping of process input bits*

## 1. Modbus report

### 1.1. Station description

Station address: 192.168.1.254

| Adr./ Slot | Name | TAG | Data Size In | Data Size Out |
|---|---|---|---|---|
| 0* | BL20-GW-EN | 192.168.1.254/BL20-GW-EN | 16 bit | 0 bit |
| 1 | BL20-BR-24VDC-RED | 01/BL20-BR-24VDC-RED | 4 bit | 0 bit |
| 2 | BL20-BR-24VDC-RED | 02/BL20-BR-24VDC-RED | 4 bit | 0 bit |
| 3 | BL20-2AIH-I | 03/BL20-2AIH-I | 192 bit | 0 bit |
| 4 | BL20-2AO-I(0/4...20MA) | 04/BL20-2AO-I(0/4...20MA) | 0 bit | 32 bit |
| 5 | BL20-2AO-U(-10/0...+10VDC) | 05/BL20-2AO-U(-10/0...+10VDC) | 0 bit | 32 bit |
| 6 | BL20-4DI-24VDC-N | 06/BL20-4DI-24VDC-N | 4 bit | 0 bit |
| 7 | BL20-4DI-24VDC-N | 07/BL20-4DI-24VDC-N | 4 bit | 0 bit |
| 8 | BL20-2DO-24VDC-0.5A-N | 08/BL20-2DO-24VDC-0.5A-N | 0 bit | 2 bit |
| 9 | BL20-2DO-24VDC-0.5A-N | 09/BL20-2DO-24VDC-0.5A-N | 0 bit | 2 bit |
| 10 | BL20-2DO-24VDC-0.5A-N | 10/BL20-2DO-24VDC-0.5A-N | 0 bit | 2 bit |
| 11 | BL20-2DO-24VDC-0.5A-N | 11/BL20-2DO-24VDC-0.5A-N | 0 bit | 2 bit |
| 12 | BL20-BR-24VDC-RED | 12/BL20-BR-24VDC-RED | 4 bit | 0 bit |
| 13 | BL20-BR-24VDC-RED | 13/BL20-BR-24VDC-RED | 4 bit | 0 bit |
| 14 | BL20-4DO-24VDC-0.5A-P | 14/BL20-4DO-24VDC-0.5A-P | 0 bit | 4 bit |
| 15 | BL20-4DO-24VDC-0.5A-P | 15/BL20-4DO-24VDC-0.5A-P | 0 bit | 4 bit |
| 16 | BL20-PF-120/230VAC-D | 16/BL20-PF-120/230VAC-D | 0 bit | 0 bit |
| 17 | BL20-2DO-120/230VAC-0.5A | 17/BL20-2DO-120/230VAC-0.5A | 0 bit | 2 bit |
| | Local I/O data incl. status/control | | 15 Words | 6 Words |
| | Summarized diagnostics | | 2 Words | 0 Words |
| Total size for in/out data rounded on full words | | | 17 Words | 6 Words |

*For detailed information about status/control word see online help.

### 1.2. I/O map for input data

| Register | | Bit position | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hex | Dec | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 0x0000 | 0000 | 03.15 | 03.14 | 03.13 | 03.12 | 03.11 | 03.10 | 03.09 | 03.08 | 03.07 | 03.06 | 03.05 | 03.04 | 03.03 | 03.02 | 03.01 | 03.00 |
| 0x0001 | 0001 | 03.31 | 03.30 | 03.29 | 03.28 | 03.27 | 03.26 | 03.25 | 03.24 | 03.23 | 03.22 | 03.21 | 03.20 | 03.19 | 03.18 | 03.17 | 03.16 |
| 0x0002 | 0002 | 03.47 | 03.46 | 03.45 | 03.44 | 03.43 | 03.42 | 03.41 | 03.40 | 03.39 | 03.38 | 03.37 | 03.36 | 03.35 | 03.34 | 03.33 | 03.32 |
| 0x0003 | 0003 | 03.63 | 03.62 | 03.61 | 03.60 | 03.59 | 03.58 | 03.57 | 03.56 | 03.55 | 03.54 | 03.53 | 03.52 | 03.51 | 03.50 | 03.49 | 03.48 |
| 0x0004 | 0004 | 03.79 | 03.78 | 03.77 | 03.76 | 03.75 | 03.74 | 03.73 | 03.72 | 03.71 | 03.70 | 03.69 | 03.68 | 03.67 | 03.66 | 03.65 | 03.64 |
| 0x0005 | 0005 | 03.95 | 03.94 | 03.93 | 03.92 | 03.91 | 03.90 | 03.89 | 03.88 | 03.87 | 03.86 | 03.85 | 03.84 | 03.83 | 03.82 | 03.81 | 03.80 |
| 0x0006 | 0006 | 03.111 | 03.110 | 03.109 | 03.108 | 03.107 | 03.106 | 03.105 | 03.104 | 03.103 | 03.102 | 03.101 | 03.100 | 03.99 | 03.98 | 03.97 | 03.96 |
| 0x0007 | 0007 | 03.127 | 03.126 | 03.125 | 03.124 | 03.123 | 03.122 | 03.121 | 03.120 | 03.119 | 03.118 | 03.117 | 03.116 | 03.115 | 03.114 | 03.113 | 03.112 |
| 0x0008 | 0008 | 03.143 | 03.142 | 03.141 | 03.140 | 03.139 | 03.138 | 03.137 | 03.136 | 03.135 | 03.134 | 03.133 | 03.132 | 03.131 | 03.130 | 03.129 | 03.128 |
| 0x0009 | 0009 | 03.159 | 03.158 | 03.157 | 03.156 | 03.155 | 03.154 | 03.153 | 03.152 | 03.151 | 03.150 | 03.149 | 03.148 | 03.147 | 03.146 | 03.145 | 03.144 |
| 0x000A | 0010 | 03.175 | 03.174 | 03.173 | 03.172 | 03.171 | 03.170 | 03.169 | 03.168 | 03.167 | 03.166 | 03.165 | 03.164 | 03.163 | 03.162 | 03.161 | 03.160 |
| 0x000B | 0011 | 03.191 | 03.190 | 03.189 | 03.188 | 03.187 | 03.186 | 03.185 | 03.184 | 03.183 | 03.182 | 03.181 | 03.180 | 03.179 | 03.178 | 03.177 | 03.176 |
| 0x000C | 0012 | 07.03 | 07.02 | 07.01 | 07.00 | 06.03 | 06.02 | 06.01 | 06.00 | 02.03 | 02.02 | 02.01 | 02.00 | 01.03 | 01.02 | 01.01 | 01.00 |
| 0x000D | 0013 | - | - | - | - | - | - | - | - | 13.03 | 13.02 | 13.01 | 13.00 | 12.03 | 12.02 | 12.01 | 12.00 |
| *0x000E | 0014 | GW..15 | GW.14 | GW.13 | GW.12 | GW..11 | GW.10 | GW.09 | GW.08 | GW.07 | GW..06 | GW.05 | GW.04 | GW.03 | GW..02 | GW.01 | GW.00 |
| **0x000F | 0015 | M15 | M14 | M13 | M12 | M11 | M10 | M09 | M08 | M07 | M06 | M05 | M04 | M03 | M02 | M01 | M00 |
| **0x0010 | 0016 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | M16 |

Description: 1.Column=Register address, n. Column=Modul number.bitposition
*) GW: gateway status-/diagnostics bits
**) M: module diagnostics (1 bit for each module)

Process input data: 17 Words

## 2.8.2 Process output/ control interface

The device has no process output data.

# 3 Installation guidelines: BL20-BR-24VDC-RED


**3.1 Redundant power supply of a BL20-station ..... 2**

3.1.1 Applicable gateways ..... 2
3.1.2 Redundant power feed directly next to the gateway ..... 3
– Gateway supply ..... 3
– Base modules to be used next to the gateway ..... 4
3.1.3 Redundant power supply of different potential groups ..... 5
– Base modules to be used for redundant supply of potential groups ..... 5
3.1.4 Digital output modules in redundantly supplied stations ..... 6

## 3.1 Redundant power supply of a BL20-station

The redundant power supply of a BL20-station is realized using two modules BL20-BR-24VDC-RED which are placed directly to the right of the gateway.

It is also possible to insert two redundant power supply modules within a station in order to redundantly supply further potential groups if required.

### 3.1.1 Applicable gateways

The BL20-BR-24VDC-RED for redundant power supply can be used with:

- BL20-GW-DPV1
- BL20-GW-EN

### 3.1.2 Redundant power feed directly next to the gateway

#### Gateway supply

The voltage feed-in of $U_L$ at the first BL20-BR-24VDC-RED next led through to the gateway.

Electrical bridges at the gateway between $U_L$ and $U_{SYS}$ as well as between $GND_L$ and $GND_{SYS}$ are used to supply the gateway electronics using $U_L$ connected to the first BL20-BR-24VDC-RED.

**Note**

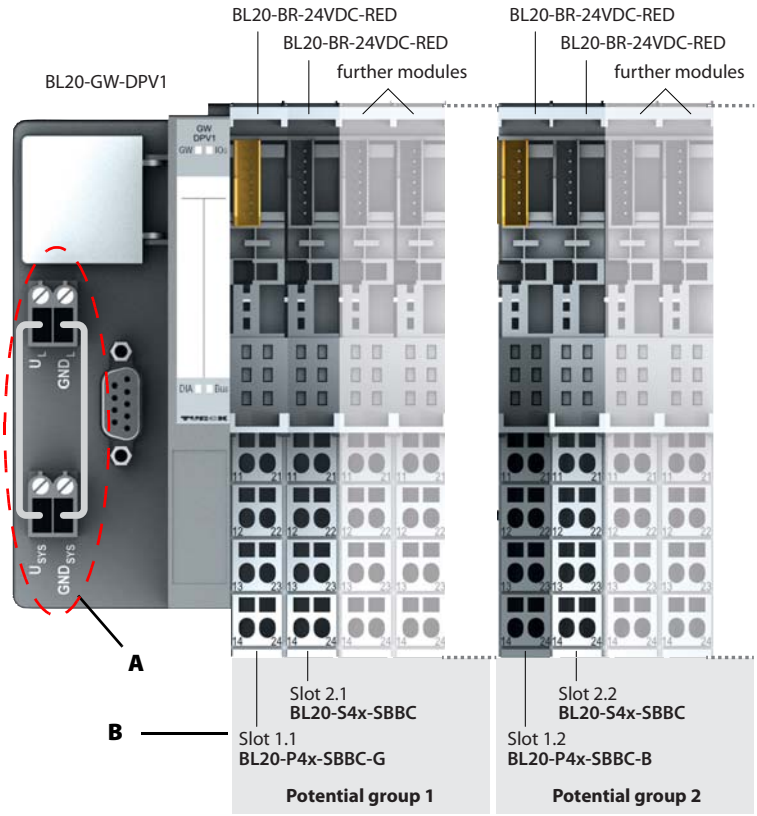
Please observe the following:

$U_{sys}$ (gateway) = $U_S$ (BL20-BR-24VDC-RED) = system voltage

**Attention**

$U_L$ and $U_{SYS}$ are **not** galvanically isolated in the first potential group with redundant BL20-BR-24VDC-RED (see Figure 3-3: Redundant power supply of potential groups).

*Figure 3-1: Station assembly with BL20-GW-DPV1 and redundant power supply*




**A** *bridge between $U_L$/$U_{SYS}$ and $GND_L$/$GND_{SYS}$ to supply the gateway*
**B** *slot x.y*
*x = position*
*y = potential group*

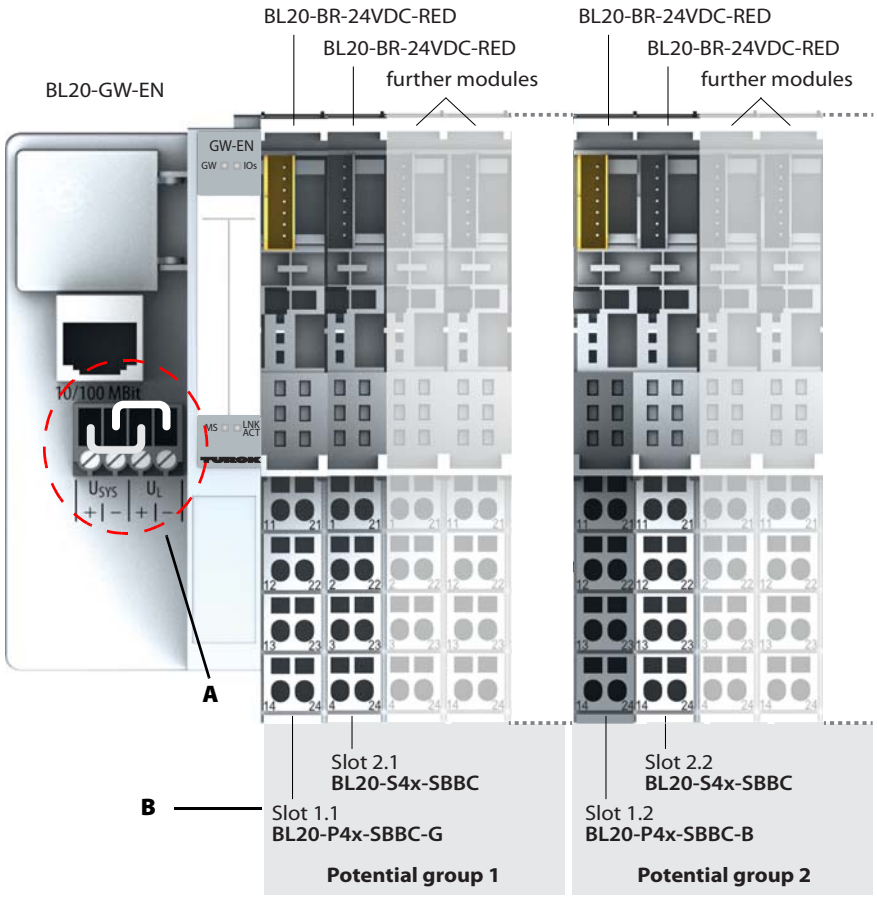



*Figure 3-2: Station assembly with BL20-GW-EN and redundant power supply*

**A** *bridge between $U_L$/$U_{SYS}$ and $GND_L$/$GND_{SYS}$ to supply the gateway*
**B** *slot x.y*
*x = position*
*y = potential group*

### Base modules to be used next to the gateway

For the **first** BL20-BR-24VDC-RED next to the gateway (slot 1), one of the following base modules has to be used:

- BL20-P4T-SBBC-**G** (tension clamp connection)
- BL20-P4S-SBBC-**G** (screw connection)

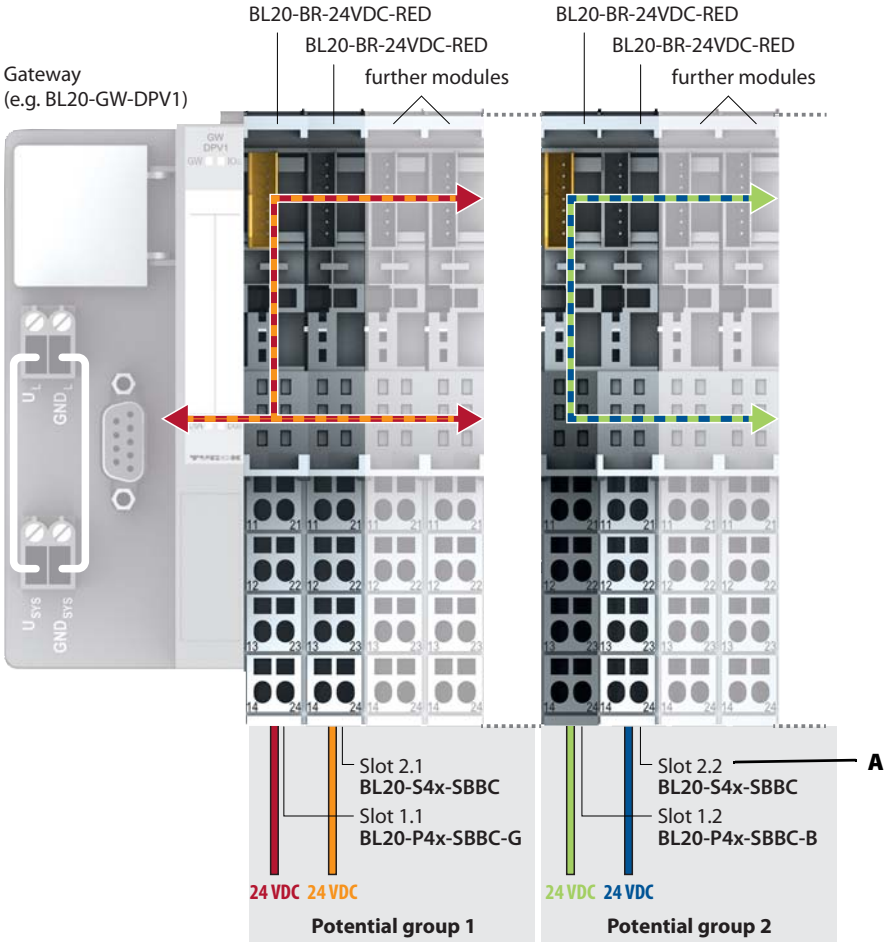
For the **second** BL20-BR-24VDC-RED (slot 2) next to the gateway, one of the following base modules can be used:

- BL20-S4T-SBBC (tension clamp connection)
- BL20-S4S-SBBC (screw connection)

### 3.1.3 Redundant power supply of different potential groups

**Base modules to be used for redundant supply of potential groups**

*Figure 3-3: Redundant power supply of potential groups*




**A***slot x.y*
*x = position*
*y = potential group*

For the **first** BL20-BR-24VDC-RED in a potential group (group n, slot 1), one of the following base modules has to be used:

- BL20-P4T-SBBC-**B** (Tension clamp connection)
- BL20-P4S-SBBC-**B** (Screw connection)

For the **second** BL20-BR-24VDC-RED in a potential group (group n, slot 2), one of the following base modules can be used:

- BL20-S4T-SBBC (Tension clamp connection)
- BL20-S4S-SBBC (Screw connection)

### 3.1.4 Digital output modules in redundantly supplied stations

**Attention**

$U_L$ and $U_S$ ($U_{SYS}$) are **not** galvanically isolated in the first potential group with redundant BL20-BR-24VDC-RED (see Figure 3-3: Redundant power supply of potential groups).

In order to support safe disconnection of digital output signals, digital output modules should be placed within a redundantly supplied potential group with galvanic isolation of $U_L$ and $U_S$ ($U_{SYS}$). An usage within the first potential group following the gateway is not reasonable.

# 4 Configuring of redundantly supplied stations with the I/O-ASSISTANT Quick Start


4.1 Starting the TURCK I/O-ASSISTANT Quick Start ..... 2

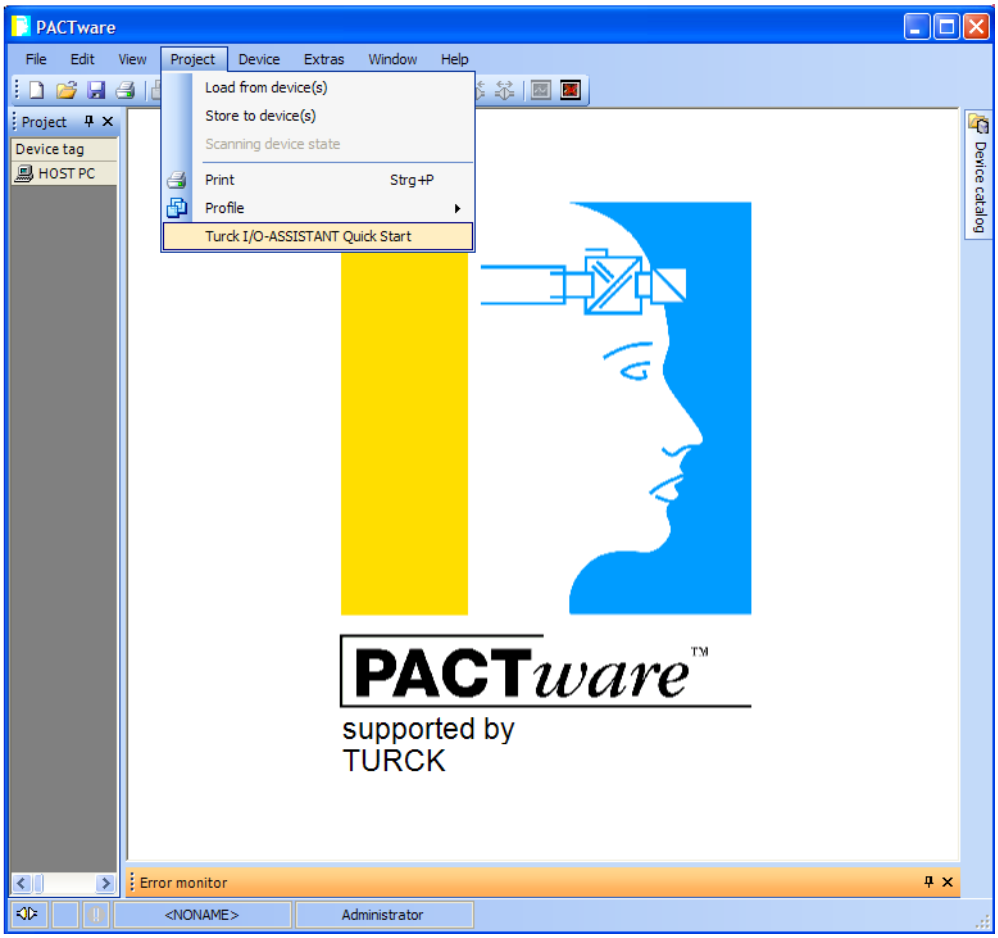
4.2 Configuring the BL20-station in the Quick Start..... 3

## 4.1 Starting the TURCK I/O-ASSISTANT Quick Start

1 Open PACTware™

2 Start the Quick Start using the "Project → TURCK I/O-ASSISTANT Quick Start"-command.^

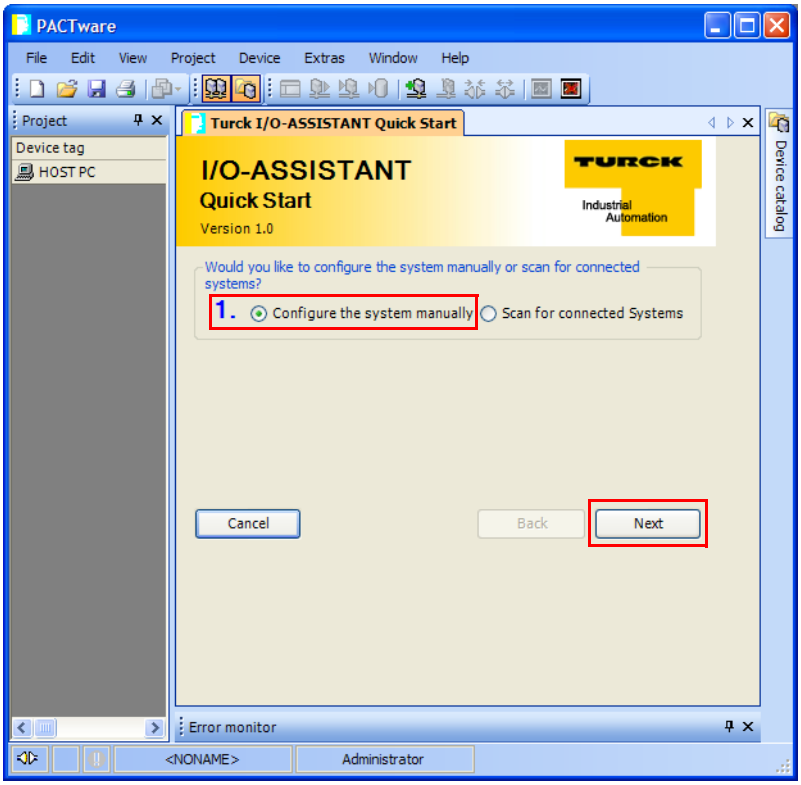
*Figure 4-1: Starting the Quick Start*



## 4.2 Configuring the BL20-station in the Quick Start

**1** Select the option "configure the system manually" and confirm the selection with "Next".

*Figure 4-2: Starting the Quick Start*



**2** Select the fieldbus interface and the protection class and confirm the selection with "Finish".

**Note**

Please observe, that the redundant power supply is only possible with the gateways defined in chapter 3, page 3-2.

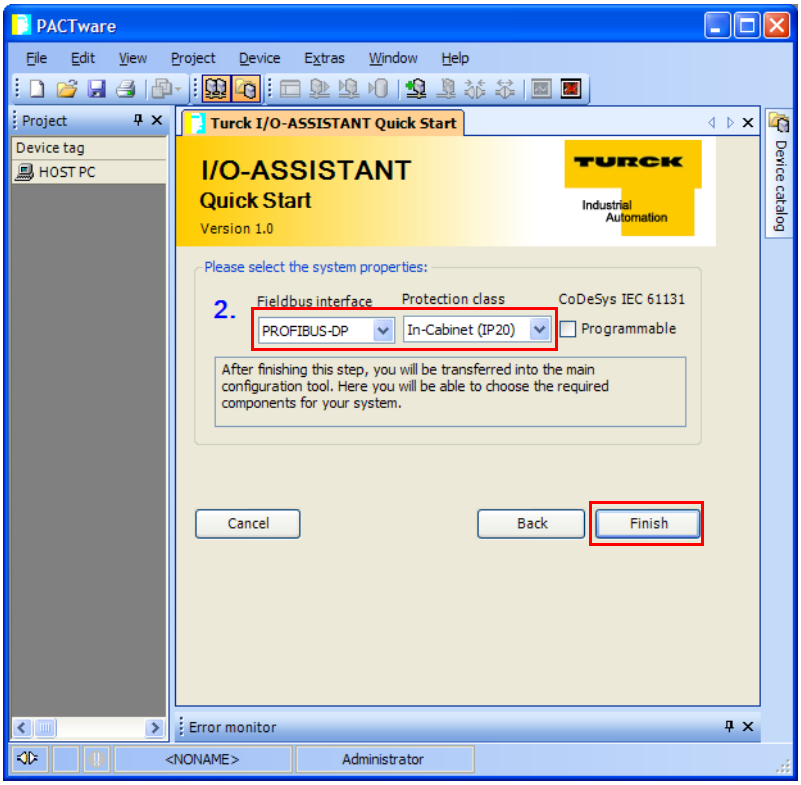
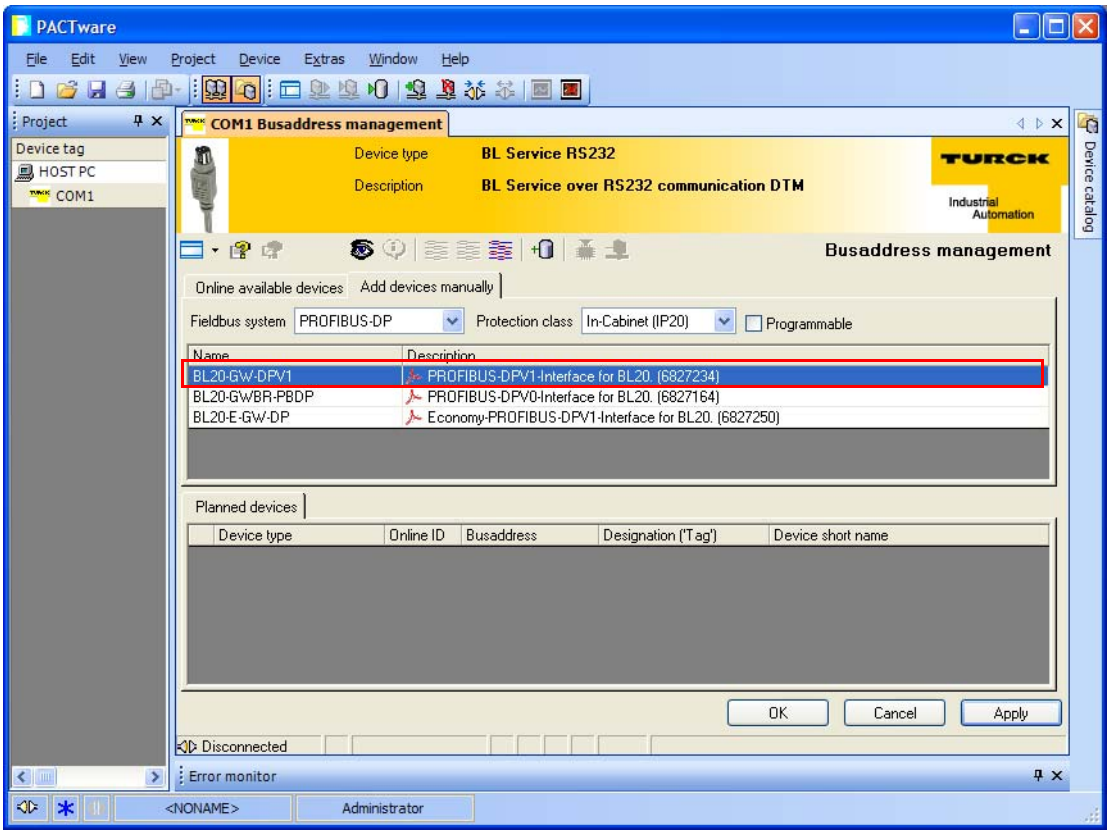



*Figure 4-3: Selecting Fieldbus interface and Protection class*

**3** The dialog box "COM1 Busaddress management" shows a selection of gateways for the chosen fieldbus protocol.

**4** Select the gateway to be used and confirm with "ok".

*Figure 4-4: Selecting the gateway*

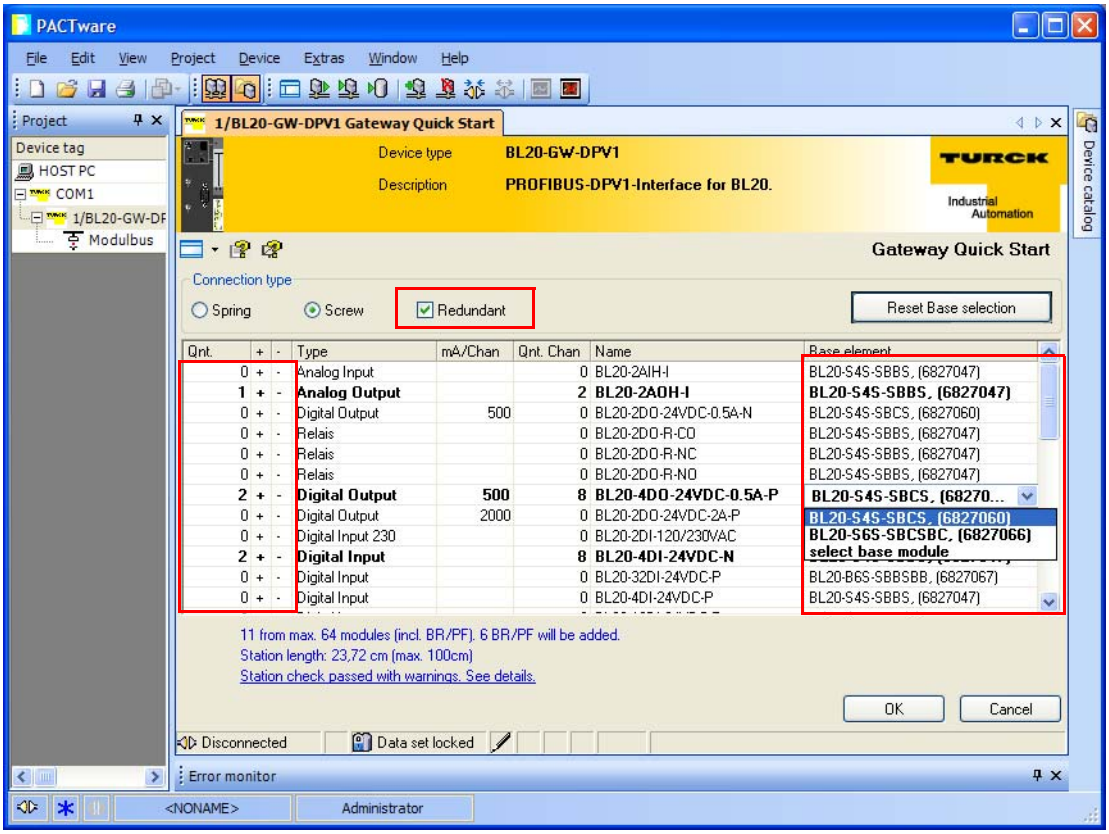


**5** In the new window "Gateway Quick Start" activate the redundant power supply of the station by selecting the respective check box.

**6** Select the used connection type and define the number and the type of the required I/O-channels.

**7** If necessary select one of the provided base modules for the respective electronics module.

*Figure 4-5: Activating the redundancy and defining the number and type of required I/O-channels*


PACTware
File Edit View Project Device Extras Window Help
Project
Device tag
HOST PC
COM1
1/BL20-GW-DP
Modulbus
1/BL20-GW-DPV1 Gateway Quick Start
Device type BL20-GW-DPV1
Description PROFIBUS-DPV1-Interface for BL20.
TURCK
Industrial Automation
Gateway Quick Start
Connection type
Spring
Screw
Redundant
Reset Base selection
Qnt. + - Type mA/Chan Qnt. Chan Name Base element
0 + - Analog Input 0 BL20-2AIH-I BL20-S4S-SBBS, (6827047)
1 + - Analog Output 2 BL20-2AOH-I BL20-S4S-SBBS, (6827047)
0 + - Digital Output 500 0 BL20-2DO-24VDC-0.5A-N BL20-S4S-SBCS, (6827060)
0 + - Relais 0 BL20-2DO-R-CO BL20-S4S-SBBS, (6827047)
0 + - Relais 0 BL20-2DO-R-NC BL20-S4S-SBBS, (6827047)
0 + - Relais 0 BL20-2DO-R-NO BL20-S4S-SBBS, (6827047)
2 + - Digital Output 500 8 BL20-4DO-24VDC-0.5A-P BL20-S4S-SBCS, (68270...
0 + - Digital Output 2000 0 BL20-2DO-24VDC-2A-P BL20-S4S-SBCS, (6827060)
0 + - Digital Input 230 0 BL20-2DI-120/230VAC BL20-S6S-SBCSBC, (6827066)
2 + - Digital Input 8 BL20-4DI-24VDC-N select base module
0 + - Digital Input 0 BL20-32DI-24VDC-P BL20-B6S-SBBSBB, (6827067)
0 + - Digital Input 0 BL20-4DI-24VDC-P BL20-S4S-SBBS, (6827047)
11 from max. 64 modules (incl. BR/PF). 6 BR/PF will be added.
Station length: 23,72 cm (max. 100cm)
Station check passed with warnings. See details.
OK
Cancel
Disconnected
Data set locked
Error monitor
<NONAME>
Administrator
Device catalog

**8** The station is automatically checked.

**9** Confirm your station configuration with "Ok".

**10** The station is automatically configured.

**11** The needed supply modules are added and, wherever one Bus Refreshing module is configured, the second one for the redundant supply is set automatically as well.

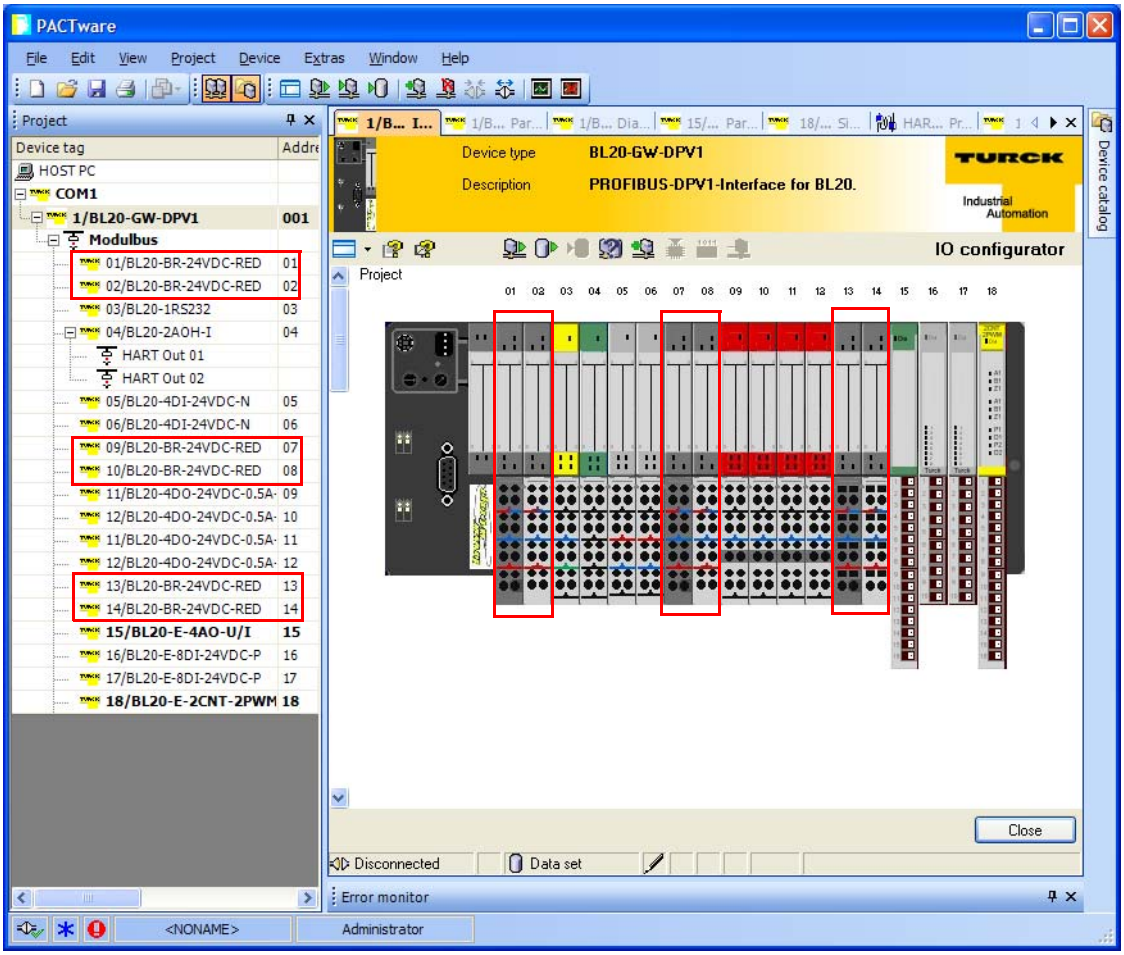



*Figure 4-6: I/O-configuration with redundant Bus Refreshing modules*

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